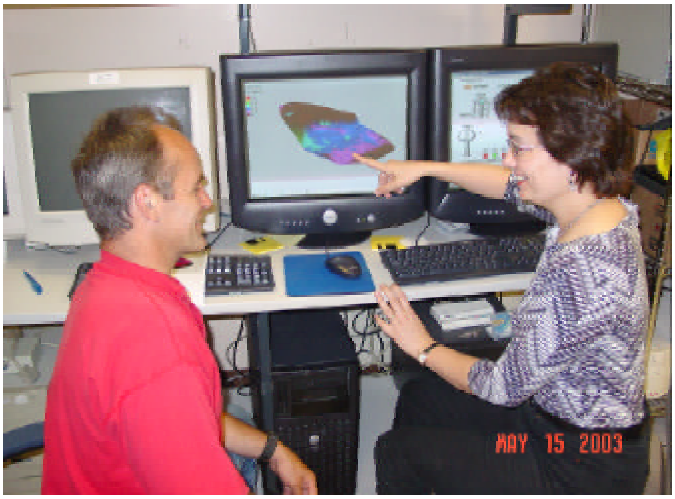
Fort Drum To Monitor Water Quality in Real Time

By Dana Finney

A new computer model interfaced to the telemetry system at Fort Drum, NY, will allow the DPW to be proactive in detecting potential drinking water quality problems. A commercial water distribution dynamic modeling software package called Aquis, combined with the existing telemetering system, will allow system operators to monitor conditions in real time.

Fort Drum's DPW asked the U.S. Army Engineer Research and Development Center (ERDC) to build the model as a means of addressing persistent problems with water quality. The distribution system is over-designed for the normal consumer demand placed on it, leading to low flow rates, diminished chlorine residuals, and potential microbial activity. Hydraulic modeling of the distribution system and storage reservoirs determined treated water in some low usage areas might be 5 - 8 days old prior to consumption.



Paul Fish, Fort Drum DPW, and Vicki Van Blaricum, CERL, discuss screens in the new water model.

"The system has a lot of supply and hydraulic redundancies to ensure we have adequate water service during times of peak demand, such as for firefighting, population influxes associated with National Guard and Reserve units for training, and system emergencies said Tom Ferguson, Chief of Operations and Maintenance at Fort Drum. "Low demand and usage can have a negative impact on water quality and freshness in some areas of our distribution system"

Further, the water can become discolored due to wide variance in the two source waters supplying the installation. Because of the constantly changing water chemistry, it is nearly impossible for the pipes to form stable oxide films that prevent corrosion and red water.

The telemetering system at Fort Drum was installed in the early 1990s to automatically monitor and control water treatment and distribution. The system works by remote sensing, which greatly reduced the requirements for labor-intensive sampling. Tying this system to the Aquis model will give the DPW a much more robust capability by displaying conditions dynamically.

"Aquis can use real-time data from the telemetering system which will allow water quality and hydraulic or low-flow problems to be detected immediately so they can be corrected," said Vicki Van Blaricum, Acting Chief of the Engineering and Materials Branch at ERDC's Construction Engineering Research Laboratory (CERL). "The model will also provide an early warning of problems as they are developing."

The monitoring system will give operators real-time data for retention times, chlorine residuals, ph, flow and pressure fluctuations, fluoride concentrations, and temperature as water travels through the distribution system.

The Aquis model includes simulation tools that will allow the DPW to create "what-if" scenarios for treatment options and emergency planning. For example, if a terrorist were to start fires in five separate locations, would the water supply be adequate for firefighting? What is the best action to take if a chemical, biological, or radioactive substance were detected in the water system? If the 10th Mountain Division mobilizes, can the water system support the increased demand at the airfield?

The model is currently being used for mathematical predictions about the water system. The DPW will install additional monitoring points over the next few months to provide data that the model needs to operate in real time. Fort Drum and CERL recently used the mathematical model to identify possible remedial measures for the

existing water quality problems. One proposal is to blend the two water sources in consistent proportions to avoid the fluctuating chemistry. The DPW could also try to control water flow locally in problem areas and abandon some pipes where flow rates are poor. Another potential solution would be to add stations for injecting chlorine and corrosion inhibitor. Finally, controlling the flow directions may help.

"The future empirical data that we'll be able to collect will validate the mathematical models and allow us to view conditions in the system dynamically," said Ferguson. He expects the water system model to be fully operational by early 2004.

For more information about Fort Drum's water system model or any related issue, please contact Vicki Van Blaricum or Vincent Hock at CERL, 800-USA-CERL, email v-vanblaricum@cecer.army.mil or v-hock@cecer.army.mil.